

Appln No. 10/634,337
Amdt date March 28, 2007
Reply to Office action of January 5, 2007

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A display panel for image display using a voltage programming method, said display panel comprising a plurality of data lines for transferring a data voltage representing an image signal, a plurality of scan lines for transferring a selection signal, and a plurality of pixel circuits, each pixel circuit being coupled to a corresponding said data line and two adjacent said scan lines, each pixel circuit comprising:

a display element capable of displaying a portion of an image, the image portion corresponding to a quantity of applied current;

a first transistor having a main electrode and a control electrode;

a capacitor coupled between the main electrode and the control electrode of the first transistor, wherein the first transistor is capable of generating the applied current in response to voltage between the main electrode and the control electrode;

a second transistor having a control electrode coupled to the control electrode of the first transistor, the second transistor being configured to operate as a diode;

a first switching element coupled to a main electrode of the second transistor, wherein the first switching element transfers the data voltage from the data lines to the second transistor in response to the selection signal from one of the two adjacent scan lines, so as to charge the capacitor with the data voltage;

a second switching element for transferring a precharge voltage to the control electrode of the first transistor in response to a first control signal before the data voltage is supplied; and

a third switching element being turned off in response to a second control signal for electrically isolating the first transistor from the display element, so as to prevent a current from being applied to the display element while the capacitor is being charged with the precharge voltage.

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2. (Original) The display panel as claimed in claim 1, wherein the third switching element is coupled between the first transistor and the display element.

3. (Original) The display panel as claimed in claim 1, wherein the two adjacent scan lines comprise a current scan line and a previous scan line, and said one of the two adjacent scan lines is the current scan line.

4. (Original) The display panel as claimed in claim 3, wherein the first control signal is the selection signal from the previous scan line.

5. (Original) The display panel as claimed in claim 4, wherein the data voltage is applied to the data lines after transferring the precharge voltage in response to the first control signal and before applying the selection signal to the current scan line.

6. (Original) The display panel as claimed in claim 5, wherein the data voltage in the data lines is changed to a desired voltage before the select signal is applied to the current scan line.

7. (Original) The display panel as claimed in claim 3, wherein the second control signal includes the first control signal.

8. (Original) The display panel as claimed in claim 7, wherein the selection signal from the previous scan line is used as both the first and second control signals, and the second switching element comprises a transistor of a first conductive type, the third switching element comprises a transistor of a second conductive type, the second conductive type being an opposite of the first conductive type.

9. (Currently Amended) ~~The display panel as claimed in claim 3,~~
A display panel for image display, said display panel comprising a plurality of data lines for transferring a data voltage representing an image signal, a plurality of scan lines for

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transferring a selection signal, and a plurality of pixel circuits, each pixel circuit being coupled to a corresponding said data line and two adjacent said scan lines, each pixel circuit comprising:

a display element capable of displaying a portion of an image, the image portion corresponding to a quantity of applied current;

a first transistor having a main electrode and a control electrode;

a capacitor coupled between the main electrode and the control electrode of the first transistor, wherein the first transistor is capable of generating the applied current in response to voltage between the main electrode and the control electrode;

a second transistor having a control electrode coupled to the control electrode of the first transistor, the second transistor being configured to operate as a diode;

a first switching element coupled to a main electrode of the second transistor, wherein the first switching element transfers the data voltage from the data lines to the second transistor in response to the selection signal from one of the two adjacent scan lines;

a second switching element for transferring a precharge voltage to the control electrode of the first transistor in response to a first control signal before the data voltage is supplied; and

a third switching element being turned off in response to a second control signal for electrically isolating the first transistor from the display element,

wherein the two adjacent scan lines comprise a current scan line and a previous scan line, and said one of the two adjacent scan lines is the current scan line, and

wherein the selection signal from the current scan line is used as the second control signal, and

the second switching element comprises a transistor of a first conductive type, the third switching element comprises a transistor of a second conductive type, the second conductive type being an opposite of the first conductive type.

10. (Original) The display panel as claimed in claim 9, wherein the selection signal from the previous scan line is used as the first control signal.

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11. (Original) The display panel as claimed in claim 3, wherein the third switching element is turned off during a time period of transferring the precharge voltage using the first control signal and another time period of transferring the data voltage using the selection signal from the current scan line.

12. (Currently Amended) ~~The display panel as claimed in claim 11,~~

A display panel for image display, said display panel comprising a plurality of data lines for transferring a data voltage representing an image signal, a plurality of scan lines for transferring a selection signal, and a plurality of pixel circuits, each pixel circuit being coupled to a corresponding said data line and two adjacent said scan lines, each pixel circuit comprising:

a display element capable of displaying a portion of an image, the image portion corresponding to a quantity of applied current;

a first transistor having a main electrode and a control electrode;

a capacitor coupled between the main electrode and the control electrode of the first transistor, wherein the first transistor is capable of generating the applied current in response to voltage between the main electrode and the control electrode;

a second transistor having a control electrode coupled to the control electrode of the first transistor, the second transistor being configured to operate as a diode;

a first switching element coupled to a main electrode of the second transistor, wherein the first switching element transfers the data voltage from the data lines to the second transistor in response to the selection signal from one of the two adjacent scan lines;

a second switching element for transferring a precharge voltage to the control electrode of the first transistor in response to a first control signal before the data voltage is supplied; and

a third switching element being turned off in response to a second control signal for electrically isolating the first transistor from the display element,

wherein the two adjacent scan lines comprise a current scan line and a previous scan line, and said one of the two adjacent scan lines is the current scan line.

wherein the third switching element is turned off during a time period of transferring the precharge voltage using the first control signal and another time period of transferring the data voltage using the selection signal from the current scan line, and

wherein the third switching element comprises third and fourth transistors coupled in series,

the second control signal comprising a third control signal for turning the third transistor off during the time period of transferring the precharge voltage, and a fourth control signal for turning the fourth transistor off during said another time period of transferring the data voltage.

13. (Original) The display panel as claimed in claim 12, wherein the selection signal from the previous scan line are used as both the first and third control signals,

the second switching element is a transistor of a first conductive type, the third switching element is a transistor of a second conductive type, and the second conductive type is an opposite of the first conductive type.

14. (Original) The display panel as claimed in claim 12, wherein the fourth control signal is a selection signal from the current scan line, and

the fourth transistor is a transistor of a type that is opposite of the type of the first transistor.

15. (Original) The display panel as claimed in claim 1, wherein the first and second switching elements are transistors of the same type as the first and second transistors.

16. (Original) The display panel as claimed in claim 1, wherein the precharge voltage is lower than a lowest data voltage from the data lines.

17. (Original) An image display device comprising:
the display panel according to claim 1;

a data driver mounted on the display panel or coupled to the display panel, said data driver being capable of applying the data voltage to the data lines; and

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a scan driver mounted on the display panel or coupled to the display panel, said scan driver being capable of applying the selection signal to the scan lines.

18. (Currently Amended) A method for driving [[an]] a voltage programming type image display device coupled to two adjacent scan lines, the image display device comprising a first transistor having a main electrode and a control electrode; a capacitor coupled between the main electrode and the control electrode of the first transistor, the first transistor being capable of generating a current corresponding to a voltage charged in the capacitor, a second transistor having a control electrode coupled to the control electrode of the first transistor and being configured to operate as a diode, and a display element capable of displaying a portion of an image corresponding to a quantity of the current generated by the first transistor, the method comprising:

transferring a precharge voltage to the control electrode of the first transistor in response to a first control signal during a first time period;

transferring a data voltage to the control electrode of the first transistor through the second transistor in response to a selection signal from one of the two adjacent scan lines during a second time period; and

interrupting the transfer of the data voltage,

wherein the first transistor is electrically isolated from the display element during at least one of the first time period [[and]] in which a capacitor coupled to the first transistor is charged with the precharge voltage or the second time period in which the capacitor is charged with the data voltage.

19. (Original) The method as claimed in claim 18, wherein the first transistor is electrically isolated from the display element in response to the first control signal during the first time period.

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20. (Original) The method as claimed in claim 18, wherein the two adjacent scan lines comprise a current scan line and a previous scan line, wherein said one of the two adjacent scan lines is the current scan line.

21. (Original) The method as claimed in claim 20, wherein the first control signal is a selection signal from the previous scan line.

22. (Original) The method as claimed in claim 19, wherein the first transistor is electrically isolated from the display element in response to the selection signal from said one of the two adjacent scan lines during the second time period.

23. (Original) The method as claimed in claim 20, wherein the first transistor is electrically isolated from the display element in response to a second control signal during the second time period.

24. (Currently Amended) ~~The method as claimed in claim 23,~~

A method for driving an image display device coupled to two adjacent scan lines the image display device comprising a first transistor having a main electrode and a control electrode; a capacitor coupled between the main electrode and the control electrode of the first transistor, the first transistor being capable of generating a current corresponding to a voltage charged in the capacitor, a second transistor having a control electrode coupled to the control electrode of the first transistor and being configured to operate as a diode, and a display element capable of displaying a portion of an image corresponding to a quantity of the current generated by the first transistor, the method comprising:

transferring a precharge voltage to the control electrode of the first transistor in response to a first control signal during a first time period;

transferring a data voltage to the control electrode of the first transistor through the second transistor in response to a selection signal from one of the two adjacent scan lines during a second time period; and

interrupting the transfer of the data voltage,

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wherein the first transistor is electrically isolated from the display element during at least one of the first time period or the second time period,

wherein the two adjacent scan lines comprise a current scan line and a previous scan line, wherein said one of the two adjacent scan lines is the current scan line,

wherein the first transistor is electrically isolated from the display element in response to a second control signal during the second time period, and

wherein the second control signal is the selection signal from the current scan line.

25. (Original) The method as claimed in claim 20, further comprising:

preventing the precharge voltage and the data voltage from being transferred to the control electrode of the first transistor between the first and second time periods.

26. (Currently Amended) ~~The method as claimed in claim 25,~~

A method for driving an image display device coupled to two adjacent scan lines the image display device comprising a first transistor having a main electrode and a control electrode; a capacitor coupled between the main electrode and the control electrode of the first transistor, the first transistor being capable of generating a current corresponding to a voltage charged in the capacitor, a second transistor having a control electrode coupled to the control electrode of the first transistor and being configured to operate as a diode, and a display element capable of displaying a portion of an image corresponding to a quantity of the current generated by the first transistor, the method comprising:

transferring a precharge voltage to the control electrode of the first transistor in response to a first control signal during a first time period;

transferring a data voltage to the control electrode of the first transistor through the second transistor in response to a selection signal from one of the two adjacent scan lines during a second time period;

interrupting the transfer of the data voltage; and

preventing the precharge voltage and the data voltage from being transferred to the control electrode of the first transistor between the first and second time periods,

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wherein the first transistor is electrically isolated from the display element during at least one of the first time period or the second time period,

wherein the two adjacent scan lines comprise a current scan line and a previous scan line,
wherein said one of the two adjacent scan lines is the current scan line,

wherein the first control signal is a selection signal from the previous scan line,

the first transistor is electrically isolated from the display element in response to the selection signal from the previous scan line during the first time period, and

the first transistor is electrically isolated from the display element in response to the selection signal from the current scan line during the second time period.

27. (Currently Amended) A voltage programming type pixel circuit, which responds to a precharge voltage from a first signal line and a data voltage representing an image signal from a second signal line, the pixel circuit comprising:

a first transistor having a main electrode and a control electrode;

a capacitor coupled between the main electrode and the control electrode, wherein the first transistor is capable of generating a current in response to a voltage charged in the capacitor;

a second transistor having a control electrode coupled to the control electrode of the first transistor, the second transistor being configured to operate as a diode;

a display element capable of displaying a portion of an image, said image portion corresponding to the current generated by the first transistor; and

switching means coupled between the first transistor and the display element,

wherein the precharge voltage is applied to the control electrode of the first transistor in response to a control signal for a first time period, and the data voltage is applied to the control electrode of the first transistor in response to a select signal for a second time period, and the first transistor is electrically isolated from the display element by the switching means during at least one of the first time period [[and]] in which the capacitor is charged with the precharge voltage,
or the second time period in which the capacitor is charged with the data voltage.

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28. (Original) The pixel circuit as claimed in claim 27, wherein the control signal is a previous select signal.

29. (Canceled).

30. (Canceled).

31. (Currently Amended) ~~The display device of claim 29, further comprising~~
A display device comprising:

a display element for displaying a portion of an image in response to a current being applied;

a first transistor having a main electrode and a control electrode, and coupled between a voltage source and the display element;

a capacitor coupled between the main electrode and the control electrode, wherein the first transistor is capable of generating the current in response to a charge in the capacitor;

a first switching element coupled between the first transistor and the display element to interrupt the current to the display element while charging the capacitor using at least one of a precharge voltage or a data voltage representative of the image portion; and

a second switching element coupled to a ~~second~~ selection signal, wherein, when the ~~second~~ selection signal is activated, the second switching element allows the data voltage to be applied to the capacitor for charging and the first switching element is turned off to prevent the current from flowing to the display element.

32. (Currently Amended) ~~The display device of claim 30, further comprising~~
A display device comprising:

a display element for displaying a portion of an image in response to a current being applied;

a first transistor having a main electrode and a control electrode, and coupled between a voltage source and the display element;

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a capacitor coupled between the main electrode and the control electrode, wherein the first transistor is capable of generating the current in response to a charge in the capacitor;

a first switching element coupled between the first transistor and the display element to interrupt the current to the display element while charging the capacitor using at least one of a precharge voltage or a data voltage representative of the image portion;

a second switching element coupled to a first selection signal, wherein, when the first selection signal is activated, the second switching element allows the precharge voltage to be applied to the capacitor for charging and the first switching element is turned off to prevent the current from flowing to the display element; and

a third switching element coupled to a second selection signal, wherein, when the second selection signal is activated, the third switching element allows the data voltage to be applied to the capacitor for charging and the first switching element is turned off to prevent the current from flowing to the display element.

33. (Original) The display device of claim 32, wherein there is a time period between when the first selection signal is un-activated and when the second selection signal is activated.

34. (Currently Amended) The display device of claim 31, wherein the first switching element is turned on to allow the current to flow to the display element when the ~~second~~ selection signal is un-activated after the capacitor has been charged using the data voltage.

35. (Canceled).

36. (Currently Amended) The display device of ~~claim 30~~ claim 32, further comprising a second transistor having a control electrode coupled to the control electrode of the first transistor, said control electrodes being coupled to the precharge voltage via the second switching element, wherein the second transistor is configured to operate as a diode.

37. (Currently Amended) A display device comprising:

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a display element for displaying a portion of an image in response to a current being applied;

a first transistor having a main electrode and a control electrode, and coupled between a voltage source and the display element;

a capacitor coupled between the main electrode and the control electrode of the first transistor, wherein the first transistor is capable of generating the current in response to a charge in the capacitor;

a first switching element coupled between the first transistor and the display element to interrupt the current to the display element while charging the capacitor using at least one of a precharge voltage [[and]] or a data voltage representative of the image portion;

a second switching element coupled to a ~~second~~ selection signal, wherein, when the ~~second~~ selection signal is activated, the second switching element allows the data voltage to be applied to the capacitor for charging and the first switching element is turned off to prevent the current from flowing to the display element; and

a second transistor having a control electrode and a main electrode, wherein the control electrode of the second transistor is coupled to the control electrode of the first transistor, the main electrode of the second transistor is coupled to the data voltage via the second switching element, and the second transistor is configured to operate as a diode.